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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,313	12/17/2004	Yoji Yamashita	263385US3X PCT	6729
22850	7590	12/27/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.			GIMIE, MAHMOUD	
1940 DUKE STREET			ART UNIT	
ALEXANDRIA, VA 22314			PAPER NUMBER	
			3747	

DATE MAILED: 12/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.



## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4 rejected under 35 U.S.C. 103(a) as being unpatentable over Vaughan et al (6,647,971) in view of Lord et al (4,118,944).

Vaughan et al discloses an EGR cooler comprising tubes (20) and a shell (18) for enclosing said tubes, cooling water being supplied into and discharged from said shell, exhaust gas from a diesel engine being guided into said tubes (20) to be heat exchanged with said cooling water.

Vaughan does not show that an inner periphery of each of the tubes (20) formed with a spiral protrusion with an inclination angle in a range of 26°-50° to a plane perpendicular to an axis of the tube.

Lord et al shows tube and shell heat exchanger (col. 2, ll. 59) with inner periphery of each of the tubes formed with a spiral protrusion with an inclination angle in a range of 45°-70° to plane perpendicular to an axis of the tube (col. 3, ll. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Vaughan et al by replacing the tube and shell heat exchanger with tube and shell heat exchanger with inner periphery of each of the tubes

formed with a spiral protrusion with an inclination angle in a range of 45°-70° to plane perpendicular to an axis of the tube as disclosed by Lord et al. The motivation to do so would have been to improve efficiency of the heat exchanger, see column 3 and lines 6-7 of Lord et al.

Please note that the prior art range overlaps with the claimed range of 26°-50° thereby being anticipated by Lord et al, see MPEP 2131.03.

With regard to claim 2, the inner periphery of each of the tubes is formed with plurality of streaks of spiral protrusions running without crossing and with phases peripherally shifted to each other.

With regard to claims 3 and 4, the height of the spiral protrusion to an inner periphery of the tube is 5-15% of an inner diameter of the tube. The prior art does not limit the height to a specific range. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

### ***Response to Arguments***

3. Applicant's arguments filed 12/9/05 have been fully considered but they are not persuasive. Applicant argued that the lead angle disclosed in Lord et al. corresponds to a range of 45°-70° with respect to a plane perpendicular to the axis of the tube, contrary to a range of 26°-50° of the current invention.

This argument is not persuasive, because the range of inclination disclosed by Lord et al. overlaps with the claimed range of inclination, thereby anticipating the present invention.

***Allowable Subject Matter***

4. Claims 5 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***


5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited references show shell and tube heat exchangers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahmoud Gimie whose telephone number is 571-272-4841. The examiner can normally be reached on Tuesday-Friday between 7 a.m. -3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Yuen can be reached on 571-272-4856. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MG

  
**MAHMOUD GIMIE  
PRIMARY EXAMINER**